not include the POT bay as part of the investment on which their cross-connection rates are based.[204]

106. Discussion. First, we find that it is not unreasonable for LECs to require that POT bays be located between the LEC's equipment and the interconnector's equipment. Based on our review of the record before us, we recognize that a POT bay may serve as a useful interface between the interconnector's facilities and the LEC's facilities.[205] We find persuasive the LECs' argument that a POT bay is an effective physical demarcation point between the respective networks to which the parties may physically connect their respective cables,[206] and at which trouble may be isolated and responsibility for repair may be determined.[207]

107. We next address whether a LEC may reasonably require a zero level signal test point POT bay, and, if so, under what terms and conditions. When the POT bay serves as a test point, it may be a digital cross-connect (DSX-1 or DSX-3).[208] Under the American National Standard Institute's Standard T1-102 (ANSI Standard),[209] when a LEC provides a POT bay that functions as a zero level signal test point, a repeater is needed to maintain the proper voltage level of a digital signal when the length of cable between the POT bay and the

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is dedicated to the interconnector. *Id.*

202 Nevada uses a jack as the point of demarcation between an interconnector's facilities and Nevada's facilities and installs cabling to connect the jack to the DS1/DS3 cross-connect panel. Nevada Direct Case at 8.

203 United and Central state that they do not require a POT frame or POT bay, but require a relay rack and DSX-1 or DSX-3 cross-connect panel for terminating the interconnector's facilities and recover the investment in this equipment through the cross-connection rate elements. United and Central Direct Case at 9.

204 Bell Atlantic Rebuttal, Attachment at 6 n.15; CBT Direct Case, Exhibit A at 8; GTE Direct Case at 20; Lincoln Direct Case at 8; Nevada Direct Case at 8; Rochester Direct Case at 5; United and Central Direct Case at 9.

205 We emphasize, however, that we require only that LECs provide a cable connection between network facilities. We do not require the use of any additional circuit equipment.

206 *See, e.g.*, SWB Direct Case at 15-20; US West Direct Case at 7-9, Exhibit 4. BellSouth asserts that if the POT bay were eliminated, it would still have to terminate its cables or develop a method to tag and identify these cables within the collocation space. BellSouth Direct Case, Exhibit 4 at 7-9.

207 *See, e.g.*, SNET Direct Case at 7; SWB Direct Case at 15-16.

208 US West's POT bay is a DSX. *See* US West Direct Case at 57. The POT bay that Ameritech provides when the interconnector does not provide this equipment for itself is also a DSX. *See* Ameritech Transmittal No. 730, Description and Justification at 2; Letter from Cronan Q. O'Connell, Director-Federal Relations, Ameritech to William F. Caton, Acting Secretary, FCC (dated June 3, 1994).

209 ANSI Standard T1.102-1993: for Telecommunications -- Digital Hierarchy -- Electrical Interfaces.

LEC's digital cross-connection bay exceeds 85 feet for a DS1 and 27 feet for a DS3 signal.[210] In contrast, when a LEC provides a POT bay that does not function as a zero level signal test point (a passive POT bay), a repeater is only necessary to maintain the proper voltage level of an electronic signal when the cabling distance between the POT bay and the LEC's cross-connection bay exceeds 655 feet for a DS1 and 450 for a DS3.[211]

108. We find that use of POT bays that function as zero level signal test points is not necessary for interconnection. Only Pacific and US West require interconnectors to use POT bays that function as zero level signal test points. All other LECs either do not require POT bays or, where they require them, permit the use of passive POT bays. Moreover, the evidence in the record indicates that other LECs use existing equipment, other than POT bays, to adjust the signal to the correct level.[212]

109. Nonetheless, given that this record does not reveal any technical problems with the use of POT bays as zero level signal test points, we will permit LECs to require use of these POT bays so long as the cost to interconnectors does not exceed that from use of passive POT bays. This permits LECs the freedom to place a test point at the POT bay, while not imposing any additional cost on the interconnector. The record indicates that the direct costs for POT bays that function as zero level signal test points are within the range of direct costs for passive POT bays. Assuming the provision of 100 DS1s, the DS1 passive POT bay direct costs for BellSouth, SNET, NYNEX,[213] and SWB are \$37, \$82, \$231 and \$571 per month, respectively.[214] Based on the same assumption that 100 DS1s are provided, the DS1 direct costs for a zero level signal test point POT bay for Ameritech, US West, and Pacific[215] are \$48, \$74, and \$65, respectively. Assuming the provision of four DS3s, the DS3

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210 This is true if the zero level signal test point POT bay is a hard-wired DSX. The zero level test point POT bay is a software controlled digital cross-connect system (DCS), for which the cabling distance limits beyond which repeaters are necessary are 655 feet for a DS1 signal and 450 feet for a DS3 signal. *See* Letter from Jay Bennett, Director Federal Regulatory Relations, Pacific to William F. Caton, Acting Secretary, FCC (dated May 30, 1996).

211 For purposes of this Order, a passive POT bay is one that does not function as a zero level signal test point.

212 SWB, for example, adds to or subtracts from the signal at its DSX to create the correct signal for the interconnector. SWB explains that if a POT bay is a zero level test point, the need for repeaters is increased. SWB Reply to Petitions to Reject at 26.

213 NYNEX states that the POT bay comprises about 60 percent of its DS1 office channel termination rate. *See* NYNEX Direct Case, Attachment L at 6. We calculate NYNEX's DS1 and DS3 POT bay direct costs by using this percentage.

214 LECs, other than SWB, develop only recurring direct costs for their POT bays. SWB develops both recurring and nonrecurring direct costs for its POT bay. *See* note 389 *infra*.

215 Pacific does not specifically identify its POT bay direct costs in its direct case. Pacific does, however, state that the actual charges that the POT bay adds to the DS1 cross-connect amounts to 71 cents. *See* Pacific Reply at 37. We therefore use this amount to determine Pacific's DS1 POT bay direct costs. In order to determine Pacific's

passive POT bay direct costs for BellSouth, SNET, NYNEX, and SWB are $10, $9, $115, and $2,212 per month, respectively. Based on the same assumption that four DS3s are provided, the DS3 direct costs for a zero level signal test point POT bay for Ameritech, US West, and Pacific are $24, $49, and $30, respectively. As detailed below, however, to the extent that the LECs' use of such POT bays requires repeaters to meet the ANSI standard, we disallow the cost of repeaters and require LECs to issue refunds to their interconnector-customers for all charges associated with repeaters.[216]

110. Thus, on a going forward basis, we permit LECs that continue to provide interstate physical collocation service under tariffs subject to this investigation to require either passive POT bays or those that function as zero level signal test points. In the event that any LEC requires POT bays that function as zero level signal test points, we require the LEC to provide the repeaters needed to comply with the ANSI standard without imposing any additional costs on interconnectors.[217]

111. We further require these LECs to allow interconnectors the option of either providing the POT bays themselves in their collocation space or purchasing this equipment from the LECs.[218] We find that this requirement would serve the public interest because the availability of equipment from a third-party vendor at the prevailing market price will help ensure that LECs offer the POT bays at market-based prices. Moreover, we believe that this requirement will not be burdensome for LECs. Ameritech and SWB both require POT bays, but allow the interconnector to provide the POT bay itself as an alternative to purchasing this equipment from the LEC.[219] If a LEC does not require a specific type of POT bay and an interconnector chooses to provide a zero level signal test point POT bay instead of a passive POT bay, we require the LEC to offer repeaters to the interconnector, but the LEC may charge the interconnector for these repeaters.

DS3 POT bay direct costs, we also assume that the POT bay adds proportionately the same amount to Pacific's DS3 cross-connect charge as it does to Pacific's DS1 cross-connect charge.

[216] *See* Section III.C.1.d.ii *infra.*

[217] *See id.*

[218] Currently, NYNEX, Pacific, and SNET are the only LECs that provide physical collocation under tariffs subject to this investigation and that require a POT bay.

[219] Objecting to Ameritech's approach, Pacific asserts that an interconnector-provided POT bay does not "meet the technical standards for a [point of termination]" under a Bellcore Technical Reference because a POT bay located in an interconnector's cage does not provide a zero level point for setting signal parameters. *See* Pacific Bell Rebuttal at 34, *citing* Bellcore Technical Reference (TR-INS-000342) (1991). Pacific does not demonstrate, however, that this technical reference applies specifically to the interface between a LEC's network and an interconnector's network and it does not explain Bellcore's rationale for adopting this technical reference. Moreover, Pacific's assertion that it would be unable to meet the Bellcore Technical Reference requirements under our approach is unconvincing because Ameritech, US West, SWB, and SNET all use POT bays that are located within the physical collocation space.

112. We require LECs to permit interconnectors that provide POT bays to install this equipment within the interconnector's space. Pacific argues that it would interfere with routine testing and cause security problems if POT bays were located in the interconnector's space. Based on the record before us, however, we find no merit to Pacific's argument. None of the other LECs in this proceeding objects to placing the POT bay in the interconnector's space. In fact, US West, SWB, and SNET use POT bays that are located within the physical collocation space as part of their cross-connection arrangements.[220] In addition, Ameritech's cross-connection arrangement includes a POT bay that is located in the physical collocation space when the interconnector provides this equipment for itself.

113. In order to provide interconnectors with the option of either providing their own POT bays or purchasing this equipment from LECs, we are hereby requiring LECs to unbundle POT bays as a rate element separate from the cross-connect rate element. Therefore, we order NYNEX, Pacific, and SNET to recalculate their cross-connection rates to exclude the cost of POT bays.

ii. Repeaters

114. Background. In the *Designation Order*, the Bureau requested LECs to state for the purpose of calculating cross-connection charges what percentage of cross-connected circuits are assumed to require repeaters.[221] The Bureau also asked LECs that use repeaters to provide cross-connection service to explain why such equipment is necessary.[222] In addition, the Bureau asked Bell Atlantic to explain why it uses a repeater on every cross-connected circuit and to estimate the portion of its physical collocation connection service rate that is attributable to repeaters.[223]

115. Bell Atlantic, BellSouth, US West, Pacific, and Ameritech include repeaters in the cost to provide DS1 or DS3 cross-connection service. Bell Atlantic assumes that 100 percent of cross-connected circuits will require repeaters.[224] Bell Atlantic estimates that repeaters comprise 95 percent of the DS1 connection service rate and 77 percent of the DS3 connection service rate.[225] BellSouth provides repeaters when the length of the cable between the customer's equipment and the cross-connect frame exceeds the distance limitations

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[220] US West Direct Case at 57; SWB Direct Case, Appendix A; SNET Direct Case, Attachment 4.

[221] *Designation Order*, 8 FCC Rcd at 6914.

[222] *Id.*

[223] *Id.*

[224] Bell Atlantic Direct Case, Attachment B at 25.

[225] *Id.*

delineated in the ANSI standard.[226] In developing its rates for cross connection, BellSouth assumes that 10 percent of the cross-connection arrangements will require repeaters.[227] US West requires repeaters when the cabling distance between the POT bay and its equipment exceeds 85 feet for a DS1 and 27 feet for a DS3. US West states that its rates include charges for repeaters on a majority of circuits.[228] Pacific requires repeaters when the cabling distance between an interconnection panel and a network element exceeds 450 feet for a DS3 and 655 feet for DS1.[229] Ameritech requires DS1 or DS3 repeaters if a customer provides a passive POT bay and the length of cable between that interconnector's transmission equipment and Ameritech's equipment is more than 655 for a DS1 or 450 feet for a DS3. When Ameritech provides a zero level signal test point POT bay, repeaters are required if the cabling distance between the POT bay and Ameritech's equipment is more than 85 feet for a DS1 and 27 feet for a DS3.[230]

116. CBT, GTE, Lincoln, NYNEX, Nevada, SNET, SWB, Rochester, United, and Central do not include the cost of repeaters in the rates for providing DS1 or DS3 cross-connection service.[231] NYNEX, GTE, and SNET state that customers are responsible for providing repeaters if they are required.[232] Nevada states that repeaters are not needed because of the short distance between the interconnector's equipment and Nevada's special access facilities.[233]

117. Discussion. We find that it is unreasonable for the LECs that are the subject of this investigation to charge interconnectors for the cost of repeaters in a physical collocation arrangement because the record demonstrates that repeaters should not be needed for the provision of physical collocation service. In the previous section, we conclude that a LEC may require either a passive POT bay or a zero level signal test point POT bay. We

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[226] BellSouth Direct Case, Exhibit 4 at 6.

[227] *Id.*

[228] US West Direct Case at 54-55.

[229] Pacific proposed this requirement in a tariff revision that was filed after the filing of its direct case. *See* Pacific Transmittal No. 1719, Description and Justification at 2-1, filed June 2, 1994.

[230] Ameritech Transmittal No. 730, Description and Justification at 6, filed August 13, 1993. Ameritech's original expanded interconnection tariff included the cost of repeaters on every circuit. *See* Ameritech Direct Case at 17.

[231] CBT Direct Case, Exhibit A at 8; GTE Direct Case at 19; Lincoln Direct Case at 7; NYNEX Direct Case, Appendix A at 20; Nevada Direct Case at 7; Rochester Direct Case at 5; SNET Direct Case at 5; SWB Direct Case at 15; United and Central Direct Case at 8.

[232] NYNEX Direct Case at 20; GTE Direct Case at 19; SNET Direct Case at 5-6.

[233] Nevada Direct Case at 7-8.

conclude, however, that the use of POT bays that function as zero level signal test points is not necessary to obtain cross-connection, and that these POT bays frequently require use of repeaters. Because POT bays that function as zero level signal test points are not necessary for interconnection, we prohibit LECs from charging interconnectors for the cost of repeaters. The record demonstrates that, under the ANSI standard, if a LEC provides a passive POT bay, or does not require a POT bay, a repeater is only necessary to maintain the proper voltage level of an electronic signal when the length of cable between the interconnector's cage and the LEC's digital cross-connect bay exceeds 655 feet for a DS1 and 450 feet for a DS3.[234] A cabling distance of 450 feet is a considerable distance, and no LEC demonstrates that it needs more than 450 feet of cable to obtain interconnection, absent the use of zero level signal test point POT bays. Moreover, the tariffs of CBT, Lincoln, Nevada, SWB, Rochester, United, and Central do not require repeaters.[235] We therefore conclude that LECs may not recover from interconnectors the cost of repeaters within their central offices in connection with physical collocation arrangements.

118. In proscribing recovery of repeater costs from interconnectors, we rely on the ANSI standard's requirement that when a passive POT bay is used, a repeater is only necessary when the cabling distance between the POT bay and the LEC's cross-connection bay exceeds 655 feet for a DS1 signal and 450 feet for a DS3 signal. We find that relying on the ANSI standard is reasonable because the purpose of the ANSI standard is to provide requirements for the covered levels of the digital network hierarchy so as to enable the interconnection of North American telecommunications networks.[236] This standard applies directly to interconnection between the telecommunications facilities of a competitive access provider and the facilities of a LEC.[237] Moreover, the ANSI standard represents the consensus of the Accredited Standards Committee on Telecommunications, T1, which is comprised of nearly 100 exchange carriers, interexchange carriers, telecommunications, computer and other high technology equipment manufacturers, and general interest parties such as major U.S. television networks, government agencies, and standards associations.[238]

119. Bell Atlantic is the only LEC that rejects the ANSI standard by requiring repeaters in all of its central offices, regardless of the length of the cable between its

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[234] *See, e.g.*, Nevada Direct Case at 7-8.

[235] CBT Direct Case, Exhibit A at 8; Lincoln Direct Case at 7; Nevada Direct Case at 7; Rochester Direct Case at 5; SWB Direct Case at 15; United and Central Direct Case at 8.

[236] The levels in the North American digital network covered by this standard are: DS1 (1.544 Mbit/s), DS1C (3.152 Mbit/s), DS2 (6.312 Mbit/s), and DS3 (44.736 Mbit/s). *See* American National Standard for Telecommunications - Digital Hierarchy - Electrical Interfaces, American National Standards Institute, Exchange Carriers Standards Association, New York, at 8 (1988).

[237] *Id.* at 2-4.

[238] *Id.*

transmission equipment and the interconnector's facilities. Although Bell Atlantic asserts that repeaters are needed to maintain quality of service to end users and to prevent potential degradation to other customers' circuits, Bell Atlantic does not explain why it is necessary to add repeaters to circuits without regard to the length of the cable between the interconnector's facilities and the LEC's facilities. The only information Bell Atlantic provides to support its requirement for repeaters is a 1984 Bellcore letter that addresses "same building arrangements" for AT&T.[239] Bell Atlantic does not explain how this information is relevant to expanded interconnection arrangements, however. We find, therefore, that Bell Atlantic fails to justify including a repeater on every interconnection circuit.

120. Accordingly, we order all LECs that continue to provide physical collocation service under tariffs subject to this investigation to establish cross-connection rates that exclude the cost of repeaters, calculate appropriate refunds, and file tariff revisions to reflect this disallowance. Moreover, we order those LECs that discontinued providing physical collocation service during the course of this investigation to recalculate their rates to exclude the cost of repeaters and issue the appropriate refunds to their interconnector-customers.

e. Bell Atlantic's Rates for Cable Racking

121. Pursuant to Transmittal No. 557, filed on February 16, 1993, Bell Atlantic's rates for physical collocation connection service covered the cost of network cable rack, repeaters, and coaxial cable.[240] On July 16, 1993, Bell Atlantic submitted Transmittal No. 585 to unbundle network cable rack from its rates for DS1 and DS3 connection service.[241] This unbundled rack rate was developed assuming that an interconnector would use a dedicated path between its cage and Bell Atlantic's frame.[242] MFS complained that this tariff provision unreasonably requires interconnectors to purchase a dedicated rack for each cross-connection order.[243] On April 1, 1994, Bell Atlantic filed Transmittal No. 645 to restructure the network cable rack rate element from a per foot, per service rate to a per service only rate.[244]

122. Bell Atlantic's cable rack rate set forth in Transmittal No. 645 assumes that a

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[239] Bell Atlantic Direct Case at 25.

[240] Bell Atlantic Tariff F.C.C. No.1, Transmittal No. 557, Section 3.1.1 (filed February 16, 1993).

[241] Bell Atlantic F.C.C. No.1, Transmittal No. 585, Section 3.1, Workpaper 4-2, Workpaper 4-3, (filed July 16, 1993).

[242] *Id.* at Section 3.1.

[243] MFS Communications Company, Inc. (MFS), Comments Opposing Direct Cases at 15 (filed September 21, 1993).

[244] Bell Atlantic Tariff F.C.C. No. 1, Transmittal No. 645, Description & Justification at 1-2 (filed April 1, 1994).

cable rack is shared by interconnectors' and Bell Atlantic's services. We believe that this tariff revision addresses the concerns raised by MFS because, following implementation of Transmittal No. 645, interconnectors were no longer required effectively to pay for the purchase of a dedicated cable rack for each cross-connect order. This change also addresses Teleport's concern that Bell Atlantic's racking rate is unreasonably high. The modified monthly rack rate is $2.50 per service, assuming an overhead factor of 1.23, which we prescribe for Bell Atlantic's physical collocation service in this Order. The new rate results in a total monthly charge of $312.50 to carry a standard 250 pair cable (125 DS1s) for any number of feet within a central office. By comparison, the old monthly rack rate, $0.13 per foot, per service yields a total monthly charge of $1,625 for a typical central office carriage of 100 feet.

123. We find that the modified rate is substantially less than the old rate and there is nothing in the record of this proceeding to indicate that a $2.50 monthly rate for racking is unreasonable. Accordingly, we disallow no portion of this rate. Bell Atlantic must, however, calculate and refund to interconnectors the difference between those revenues that Bell Atlantic collected at the rates that existed for network cable rack, repeaters, and coaxial cable prior to April 1, 1994, and the revenues that it would have collected during that same period for network cable rack, repeaters, and coaxial cable under Transmittal No. 645. We are making this disallowance because the rates for physical collocation service must be based on the costs of providing that service and Bell Atlantic provides no argument or evidence that its costs of network cable rack, repeaters, or coaxial cable used to provide physical collocation services have decreased between the date it initially provided physical collocation and the date it discontinued providing physical collocation, or the date it changed the rate structure that recovers the costs of network cable rack, repeaters, and coaxial cable.

2. Average Cost Analysis

a. The Rationale for Industry Average Cost Analysis

124. In the preceding section of this Order, we evaluate the reasonableness of the LECs' direct costs on a case-by-case basis by examining LECs' direct cases and other cost data that they provide in this proceeding. By using this approach, we are able to judge, to some extent, the reasonableness of LECs' direct costs. In some cases, we are making disallowances where we find that LECs miscalculate their direct costs or use improper methodologies for calculating their direct costs.

125. In this section of this Order, we evaluate the reasonableness of LECs' physical collocation costs by comparing physical collocation direct costs among LECs. We conduct a review of LECs' cost justifications by comparing the direct costs of all LECs that provide physical collocation service on a function-by-function basis. We perform our function-by-function analysis by developing industry-wide average direct costs and calculating the standard deviation of those costs relative to that average for each function associated with providing physical collocation. If a LEC has direct costs for a particular function that are

greater than one standard deviation above the industry-wide average for that function, we determine whether the LEC justifies its high direct costs for that function by scrutinizing the LEC's cost data and any explanations the LEC makes on the record.[245] If the LEC fails to justify high direct costs for the function, we disallow the direct costs to the extent that they exceed one standard deviation above the average.

126. As discussed in more detail below, averaging LECs' costs is a reasonable method of prescribing rates for physical collocation service for three reasons. First, pursuant to our direction, all the LECs in this investigation have allocated their costs among the same 14 functions that together comprise a physical collocation arrangement.[246] Second, the LECs' physical collocation arrangements are substantially similar and the direct costs of providing the service should not, therefore, differ significantly among LECs. Third, LECs' physical collocation costs are not precise figures; they are necessarily estimates of LECs' direct costs. As is almost always the case when many different parties make estimates, the estimates vary depending on the assumptions and methods used. A common practice in dealing with multiple estimates is to use some measure of central tendency (such as an arithmetic average, the median, or the modal value) as the best measure of the true value. Extreme estimates are often discarded when calculating averages on the rationale that these estimates are more likely to be in error than the more clustered estimates and that introducing these large errors into the calculations reduces rather than increases the accuracy of the averages as an estimate of the true value. The use of an average calculated from direct cost data after first discarding extreme estimates reduces the possibility that the assumptions and methods a particular LEC uses to estimate its costs will result in over or under estimates of that LEC's costs. We explain these reasons in detail below.

i. Costs Allocated Uniformly into Functions

127. We find, first, that we are able to use industry-wide average costs to evaluate the reasonableness of each LEC's physical collocation service direct costs because, pursuant to the cost reporting requirements set forth in the Bureau's *Designation Order*,[247] LECs subject to this investigation have allocated their physical collocation costs uniformly among 14 functions that together comprise a physical collocation arrangement. Allocating these costs among the same 14 functions eliminates confusion over the costs that are recovered by rates for particular rate elements and facilitates a comparison of these costs among LECs.

[245] An explanation of the methodology for calculating the industry average plus one standard deviation is contained in Section III.C.2.c *infra*. The direct cost calculations for each LEC in this investigation, the calculation of the industry average direct cost for each function, and the standard deviation of the direct costs relative to that average for each function are contained in the chart in Appendix B.

[246] For further explanation, *see* para. 63 *supra*.

[247] *Designation Order*, 8 FCC Rcd at 6911-12.

128. Some of the variance in the estimates of each of the 14 functions is attributable simply to differences in how LECs assigned direct costs to particular functions. In order to minimize these differences, we aggregate the direct costs for the 14 physical collocation functions into the direct costs for the following seven functions: floor space direct costs; DC power direct costs; cross-connection and termination equipment direct costs; security installation direct costs; security escort direct costs; construction direct costs; and entrance facility direct costs. We believe that collapsing the 14 functions into seven functions will largely eliminate any differences in LEC allocations of direct costs to functions. Aggregating the direct costs for closely related functions into more broadly defined functions enhances the reliability of the data because it renders harmless any errors some LECs may make by erroneously assigning certain data to the wrong functions.[248]

129. Moreover, we maximize the utility of these data for comparative analysis by adjusting the data when LECs' physical collocation offerings differ or when the LECs assign the same physical collocation costs to different functions. For example, we exclude the floor space direct costs and DC power direct costs of BellSouth, CBT, and Central from the data we use to calculate the average and the standard deviation for those functions because, unlike other LECs, these LECs apparently include the cost of AC power converted to DC power in their floor space direct costs.[249]

130. We also exclude direct costs for a particular function that are either more than two standard deviations[250] above the LEC direct cost average or more than two standard deviations below the LEC direct cost average.[251] We believe that these extreme estimates are likely to be due to errors in the estimation process and, if not excluded from our calculations, would tend to move the averages away from the values submitted by the majority of the LECs. We also believe that including the extreme values would lead to erroneously high estimates of the size of the standard deviation from the average. By excluding direct costs that lie outside of this range, we minimize the likelihood that the distribution of LECs' direct costs is skewed unreasonably upward by one or two extremely high direct cost data points or

[248] Some LECs may, for example, include costs for certain equipment in the termination equipment function, while other LECs may include the same equipment in the cross-connection function. By combining these functions, we ensure a reliable analysis of cross-connection and termination equipment costs among all LECs.

[249] *See* Sections III.C.2.d and III.C.2.e *infra*.

[250] We use the formula for the sample standard deviation for this purpose. The rationale for use of the sample standard deviation is discussed below.

[251] We determine whether a LEC's direct costs are greater than two standard deviations above or greater than two standard deviations below the LEC direct cost average after making all of the adjustments described above to the data.

downward by one or two extremely low direct cost data points.[252] At the same time, there are only three LEC direct cost estimates that are either more than two standard deviations above the LEC direct cost average or more than two standard deviations below the LEC direct cost average, requiring us to exclude them from the data that we use to calculate the industry average. For example, we remove Nevada Bell's DC power and DS1 and DS3 cross-connection and termination equipment direct costs from the data base[253] because the direct costs it develops for these functions exceed the industry average by more than two standard deviations.[254] If we were to include Nevada Bell's estimate in the sample of estimates we use to calculate the average and the standard deviation, the average would not be an accurate measure of the central tendency or location of the direct cost data, which is the purpose for which it is designed.[255] The standard deviation calculated based on that average would also be less meaningful as a statistic for describing the overall distribution of the data.

ii. Similarity of Physical Collocation Arrangements Among LECs

131. We also are able to use industry-wide average direct costs to evaluate the reasonableness of each LEC's physical collocation costs because the physical collocation services LECs offer are substantially similar and the direct costs associated with the provision of that service should not differ significantly among LECs. While we did not mandate a uniform rate structure, and would not expect the direct costs of any two LECs to be identical, the record indicates that all LECs generally use the same assets and perform the same tasks to provide physical collocation service. When the record indicates that some LECs' physical collocation assets or service offerings differ, we make adjustments to the cost data to account for these differences before calculating the average and the standard deviation. We also make adjustments to the cost data when the record indicates that some LECs' direct costs are not directly comparable to other LECs' direct costs because the same costs are assigned to different physical collocation functions.

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[252] A distribution that is skewed is one that is not symmetric. A distribution is skewed upward if the longer of the distribution's two tails is to the right. Conversely, a distribution is skewed downward if the longer tail is on the left.

[253] We do not, however, exempt Nevada Bell from any disallowance based on our statistical analysis of this function.

[254] For a further discussion of Nevada Bell's reported DC power and DS1 and DS3 cross-connection and termination equipment direct costs, *see* paras. 158, 197, 216 *infra*.

[255] We exclude SWB's reported POT bay direct costs from the data that we use to calculate the industry direct cost average and the standard deviation for this equipment because SWB's direct costs are also in excess of two standard deviations above the industry average. *See* para. 227 *infra*. No direct costs other than Nevada Bell's direct costs for the DC power and DS1 and DS3 cross-connection and termination functions and SWB's direct costs for the POT bay are in excess of two standard deviations above the industry average and no other direct costs are excluded from the data for this reason.

132. The DC power function is similar among LECs that provide physical collocation service because these LECs supply interconnectors with DC power by using a central office power serving arrangement that ordinarily includes a back-up generator, a power plant comprised of batteries, rectifiers, and associated equipment, cable, the battery distribution fuse bay, and cable racking from the power plant to the battery distribution fuse bay.[256] We exclude the DC power costs of BellSouth, CBT, and Central from the data on which we calculate the average and the standard deviation for this function because, unlike other LECs, these three LECs apparently include the cost of AC power converted to DC power in their floor space direct costs. LECs' DC power costs are comparable once we make this adjustment to the data.[257]

133. The floor space function also is substantially similar among LECs because every LEC's floor space costs are for occupancy of central office floor space by the interconnector, including all ancillary and housekeeping services. We exclude the floor space direct costs of BellSouth, CBT, and Central from the data on which we calculate the average and the standard deviation for this function because, as explained above, apparently only these three LECs include the cost of AC power converted to DC power in their floor space direct costs. LECs' floor space costs are comparable after making this adjustment to the data.[258]

134. Cross-connection and termination equipment costs for every LEC that provides physical collocation include costs associated with cross-connection provisioning, the cross-connection cable and cable support, the cross-connection equipment, and the termination equipment. Although the record indicates that there is some variation in the way LECs provide cross-connection and termination equipment services, we adjust the data upon which the average and the standard deviation are based to ensure that the data from all the carriers reflect comparable costs. LECs develop these costs based on the investment for the cable connection between the collocation space and the central office distributing frame or digital service cross-connection frame, cross-connect panels on the DSX frame, interface panels, cable rack, bay framework, and other supporting hardware. Some, but not all, LECs' cross-connection and termination equipment direct costs include costs for repeaters and POT bays. We therefore remove the costs of repeaters and POT bays from the cross-connection and termination equipment cost data that we use to calculate the average and the standard deviation for this function.[259] We also remove GTOC's cross-connection and termination equipment cost from the cost data for this function because GTOC requires its interconnector-customers to provide the cable from the interconnector's equipment to GTOC's DSX bay and

[256] Pacific Direct Case at 14-15.

[257] We evaluate the reasonableness of these three LECs' DC power and floor space direct costs separately. *See* paras. 192, 207-211 *infra*.

[258] Again, we evaluate the DC power and floor space direct costs separately for these three LECs. *See id.*

[259] For further explanation, *see* paras. 157, 215 *infra*.

no other LEC imposes this requirement.[260] After making these adjustments, the record shows that there is not a wide variation in the cross-connection and termination equipment function LECs provide to their interconnector-customers.[261]

135. Direct costs associated with security include security installation costs and active security costs. We find that active security services are substantially similar among LECs because LECs that provide this service recover costs for providing additional security attributable to collocation, including the costs of providing extra security guards or escort service. Differences in the security installation function among LECs require that we make certain adjustments to the data. Security installation costs include the costs for all construction associated with additional security needs attributable to collocation. Several LECs provide the security installation function through a card access system, while other LECs provide this function without a card access system. Therefore, when we calculate industry-wide average direct costs for security installation, we divide the LECs into two groups: those that provide card access systems and those that provide other security systems. After making this adjustment, we find that there is not a wide variation in the security installation function among LECs within each of these two groups.

136. Direct costs associated with construction include interconnector-specific construction, common construction, and construction provisioning. Interconnector-specific construction is substantially similar among LECs because the major component of interconnector-specific construction for all LECs is the construction of a cage. We find that a cage for physical collocation is a fairly standard product that does not vary substantially among LECs.

137. In addition, common construction activities do not vary substantially among LECs because in all cases they include: (1) all design, engineering and project management for common construction; and (2) all actual common construction, including common environmental conditioning, common lighting, and common floor reconditioning, none of which is attributable to a specific interconnector. Most LECs develop direct common construction costs based on averages of their estimated central office direct common construction costs. The common construction activities required to prepare the central office for physical collocation should be similar at each central office. Moreover, the quantities of labor and materials associated with common construction should on average be similar among LECs. The averaging process by which LECs calculate their costs minimizes the effects of any extremely high or low common construction requirements for any particular central office that may be reflected in the data from which LECs compute these averages. There is no evidence in the record to suggest that there are substantial differences in the pre-existing conditions of a large number of any particular LEC's central offices compared to pre-existing

260 For further explanation, *see* para. 216 *infra*.

261 We evaluate the reasonableness of GTOC's cross connection and termination equipment direct costs separately. *See* paras. 224, 225 *infra*.

conditions of other LEC's central offices. Accordingly, we do not find that the quantities of labor and materials needed to prepare any particular LEC's central offices for physical collocation are substantially greater than those needed to prepare the central offices of other LECs.

138. We also find that the construction provisioning function does not vary substantially from LEC to LEC. Construction provisioning involves ordering, surveying, designing, engineering, and managing activities related to construction of the interconnector's space and cage, and these services appear to be standard offerings among the LECs.

139. We ensure comparability among the LECs' construction costs by excluding construction estimates for Bell Atlantic, Rochester, Lincoln and Central from the data we are using to determine the industry average construction cost. These LECs charge their interconnector-customers for the actual costs of the labor and materials used for the common construction at a particular central office for a particular interconnector. The other LECs file a rate designed to recover the estimated cost of that construction.

140. Finally, we make adjustments to the entrance facility direct cost data to address differences in the entrance facility space and installation function among LECs. While some LECs install the interconnector's cable from the manhole outside the central office to the interconnector's space inside the central office, other LECs do not provide this service. We address this difference by dividing LECs into two groups: LECs that install the interconnector's cable and LECs that do not install the interconnector's cable. After making this adjustment, we find that there is not a wide variation in the entrance facility function among LECs within each of these two groups. LECs develop entrance facility space direct costs based on investments for similar physical assets used in the interconnection arrangement from the manhole to the interconnector's space, including the manhole, conduit, vault, cable rack and riser duct. The entrance facility installation costs are for installing an interconnector's arrangement from the manhole to the interconnector's space. These costs are primarily for the labor required to install entrance facilities, *e.g.*, splicing, splice testing, cable pulling, and cable placement. These labor activities are not likely to vary substantially among LECs.

141. We remove Lincoln's reported entrance installation and space direct costs from the data on which we calculate the average and the standard deviation for this function because Lincoln recovers the actual costs of the labor and materials used for the construction of the entrance facility at a particular central office for a particular interconnector. The other LECs file a rate designed to recover the estimated cost of entrance installation.

iii. <u>LECs' Direct Cost Estimates</u>

142. The physical collocation direct costs LECs develop are necessarily estimates because these costs pertain to a new service for which most LECs have little or no operating experience or relevant historical data. The absence of operating experience or relevant

historical data from which to make cost estimates leads to variation in LEC estimates that is attributable to differences in the assumptions and methods that they employ. Furthermore, some of the physical collocation functions for which cost estimates are required are not comparable to any function required for any other telecommunications service. For example, a cage is not part of the standard offering of any other telecommunications service of which we are aware. Thus, LECs are unable to employ one of the major tools commonly used for cost estimation -- comparing the costs of the service under investigation to the costs of another service that is comparable in terms of the assets and the tasks required to provide that service.

143. Given the relative imprecision with which LECs make these estimates under these circumstances, we find that it is reasonable to pool all of the LECs' direct cost estimates and to calculate an industry-wide average. In our view, an industry-wide average cost calculated for physical collocation functions that are essentially the same among all the LECs is more reliable than the cost estimates provided by any one LEC for these functions. We find that this is so because the LECs' direct cost estimates vary depending on the particular assumptions and methods each LEC uses to make these estimates. For the group of LECs in the sample from which we calculate the average, positive and negative deviations from the true cost of providing the same function will tend to cancel out because of the law of large numbers.[262] At the same time, the average of these direct cost estimates incorporates far more of the available information than any individual cost estimate. The average therefore provides a more reliable estimate of the underlying true cost of a function than any one estimate. Accordingly, we find that calculating the industry-wide average direct cost for all LECs that offer the same physical collocation service using similar assets and performing similar tasks, and using that average to evaluate the magnitude of the separate cost estimates of each LEC, reduces the possibility that any particular LEC will recover in its physical collocation rates more than that LEC's direct costs.

b. Legal Authority for Making Rate Prescriptions on the Basis of Industry Average Costs

144. We find that prescribing rates on the basis of an industry's average costs, as we do in this Order, is consistent with our authority under Section 205(a) of the Communications Act. Section 205(a) provides in pertinent part that, whenever "after full opportunity for hearing, . . . the Commission shall be of opinion that any charge . . . of any carrier or carriers is or will be in violation of any of the provisions of this Act, the Commission is authorized and empowered to determine and prescribe what will be the just and reasonable charge."[263]

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[262] Fourteen of the 16 LECs that were required initially to file physical collocation tariffs either currently offer physical collocation service or previously offered the service and had at least one physical collocation customer. The data that we use to calculate the industry average direct cost for each physical collocation function are the direct costs of these 14 LECs.

[263] 47 U.S.C. § 205(a).

Courts have consistently found in the Act a Congressional intent to grant us broad discretion in "selecting methods . . . to make and oversee rates."[264] In doing so, we may make any "reasonable selection from the available alternatives."[265] Rather than insisting upon a single regulatory method for determining whether rates are just and reasonable, courts and other federal agencies with rate authority similar to our own evaluate whether an established regulatory scheme produces rates that fall within a "zone of reasonableness."[266] For rates to fall within the zone of reasonableness, the agency rate order must constitute a "reasonable balancing" of the "investor interest in maintaining financial integrity and access to capital markets and the consumer interest in being charged non-exploitative rates."[267]

145. Our discretionary authority to prescribe rates based on the cost-averaging methodology described below is directly supported by the Supreme Court's decision in the *Permian Basin Area Rate Cases.*[268] In that decision, the Court upheld the Federal Power Commission's (FPC) decision to depart from its former practice of determining the reasonableness of natural gas producers' rates by examining the costs of each company on a case-by-case basis.[269] The Court found that the FPC's decision to prescribe maximum area rates for interstate natural gas sales based on composite cost data obtained from published sources and from producers through a series of cost questionnaires, fell within the "zone of reasonableness" required by the Natural Gas Act.[270] The Court emphasized that the Natural Gas Act had conferred upon the FPC broad responsibilities to regulate interstate distribution of natural gas and that prescribing rates based on composite industry data was a valid exercise

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[264] *MCI Telecommunications Corp. v. FCC,* 675 F.2d 408, 413 (D.C. Cir. 1982) (quoting *Aeronautical Radio v. FCC,* 642 F.2d 1221, 1228 (D.C. Cir. 1980), *cert. denied,* 451 U.S. 920 (1981)). *See also Western Union Int'l v. FCC,* 804 F.2d 1280, 1292 (D.C. Cir. 1986) ("The FCC's judgment about the best regulatory tools to employ in a particular situation is . . . entitled to considerable deference from the generalist judiciary."); MTS and WATS Market Structure, CC Docket No. 78-72, Phase I, Third Report and Order, 93 FCC 2d 241, 259 (1983) ("[A] prescribed rate is just and reasonable for purposes of Section 205(a) if it represents the best approximation of a rate that satisfies all statutory requirements that this Commission is capable of devising within a reasonable period of time.").

[265] *MCI Telecommunications,* 675 F.2d at 413.

[266] *See, e.g., FERC v. Pennzoil Producing Co.,* 439 U.S. 508, 517 (1979); *AT&T v. FCC,* 836 F.2d 1386, 1390 (D.C. Cir. 1988) (quoting *Jersey Cent. Power & Light v. FERC,* 810 F.2d 1168, 1177 (D.C. Cir. 1987)). *See also Wisconsin v. FPC,* 373 U.S. 294, 309 (1963); *FPC v. Natural Gas Pipeline Co.,* 315 U.S. 575, 585-86 (1942).

[267] *Jersey Cent. Power & Light,* 810 F.2d at 1177-78. *See Pennzoil Producing,* 439 U.S. at 517 (to fall within the zone of reasonableness, rates must be neither "less than compensatory" nor "excessive.").

[268] 390 U.S. 747 (1968).

[269] *Id.* at 768-70.

[270] *Id.* at 768-74. The Court noted that Congress had entrusted the regulation of the natural gas industry to the "informed judgment of the Commission," and stated that "a presumption of validity therefore attaches to each exercise of the Commission's expertise." *Id.* at 767.

of the FPC's discretionary authority under the Act:

> [T]he "legislative discretion implied in the rate making power necessarily extends to the entire legislative process, embracing the method used in reaching the legislative determination as well as that determination itself." It follows that rate-making agencies are not bound to the service of any single regulatory formula; they are permitted, unless their statutory authority otherwise plainly indicates, "to make the pragmatic adjustments which may be called for by particular circumstances."[271]

146. In light of our broad discretion to select appropriate regulatory tools for ratemaking purposes, we have, on other occasions, made rate prescriptions based on costs determined in part by an industry-wide average or mean. Our decision in this investigation to make rate prescriptions on the basis of an industry average is consistent, for example, with the methodologies we used to (1) establish a unitary rate of return for LECs' interstate access services,[272] (2) create a productivity factor for price cap LECs,[273] and (3) determine the reasonableness of depreciation rates for price cap LECs.[274]

147. We conclude that the methodology we are using for the purpose of prescribing rates in this tariff investigation ensures that the LECs' direct costs of providing physical collocation fall within a zone of reasonableness. We adopt this approach after making a

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[271] *Id.* at 776-77 (citations omitted). The Court cited as precedent *Los Angeles Gas Co. v. Railroad Comm'n*, 289 U.S. 287, 304 (1933); *San Diego Land & Town Co. v. Jasper,* 189 U.S. 439, 446 (1903); *FPC v. Natural Gas Pipeline Co.*, 315 U.S. 474, 586 (1942).

[272] *Rate of Return Represcription Order*, 5 FCC Rcd at 7507-508. In prescribing the LECs' rate of return in the rate of return represcription proceeding, we (1) determined the cost of debt by calculating the average embedded cost of debt among the seven regional holding companies (RHCs) and (2) established the LECs' capital structure by determining the average embedded capital structure of the RHCs. Furthermore, the discounted cash flow method that we used to calculate the cost of equity established a single estimate of that cost for the entire LEC industry. *Id.* at 7508.

[273] Policy and Rules Concerning Rates for Dominant Carriers, CC Docket No. 87-313, Second Report and Order, 5 FCC Rcd 6786, Appendix C (1990). The price cap scheme adopted in this Order adjusts the maximum prices that LECs may charge for their interstate services using a productivity factor ("X-Factor") that is based on data measuring the industry-wide average performance of the LECs. The validity of this methodology was reaffirmed in our Price Cap Performance Review for Local Exchange Carriers, First Report and Order, CC Docket No. 94-1, 10 FCC Rcd 8961, 9027 (1995).

[274] Simplification of the Depreciation Prescription Process, CC Docket No. 92-296, Report and Order, 8 FCC Rcd 8025, 8050 (1993). In determining whether a LEC's depreciation rates are presumptively reasonable, three factors are considered: the projected life of plant, the future net salvage value of plant, and a survivor curve. The Commission uses an industry average to develop ranges for two of the three factors, the projected life of plant and future net salvage value. These ranges are based on intervals of one standard deviation around the industry-wide mean value of the projected life of plant and future net salvage of plant underlying existing depreciation rates. *Id.* at 8050.

"reasonable selection from the available alternatives."[275] We considered several statistical standards for evaluating the reasonableness of the LECs' physical collocation direct costs. For example, we considered using the overall LEC average or the overall LEC median direct cost for each function as the standard for making disallowances. These are measures of the central tendency of the data. We do not use either of these methodologies because they fail to recognize that some LECs reasonably may provide physical collocation service somewhat less efficiently than other LECs. While we believe that, in general, physical collocation service is a homogeneous service for which the cost should not vary substantially among LECs, we find that there may be some reasonable differences in their direct costs and in their levels of efficiency. In addition, as we explained above, the LECs' direct costs are *ex ante* estimates, not precise *ex post* accounting figures. Thus, while a statistical approach is appropriate, the strict use of the average or the median as the standard of reasonableness may not reflect the fact that the direct costs reported by LECs are estimates that may be relatively imprecise because these estimates are for a new service.

148. We also considered using the overall LEC average plus two standard deviations as the standard for making disallowances to the LECs' direct costs of physical collocation. We reject this standard, however, because the probability that any LEC's direct cost for a particular physical collocation function will lie within two standard deviations above and below the overall LEC average direct cost for that function is *always* 75 percent and *often* 95 percent or higher.[276] The probability that a LEC's physical collocation direct cost for a given function will lie below the overall LEC average plus two standard deviations for the same function is even greater. By examining the LECs' direct cost data, we find that nearly all the LECs' direct costs fall within two standard deviations above the overall LEC average for every function even though there is a large variance of direct costs among LECs.[277] Accordingly, although the direct costs that lie within two standard deviations above the overall LEC average for each function exhibit large variance, we would not address that variance if we were to use two standard deviations as our standard of reasonableness. In addition, all LECs have ample incentive to inflate the direct cost of physical collocation because these are the rates that they are imposing on the interconnector-customers against which the LECs compete in the interstate access market. In light of that incentive, the use of the average plus two standard deviations would, therefore, provide too much flexibility.

149. We are using the average plus one standard deviation as our standard for

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275 *MCI Telecommunications*, 675 F.2d at 413.

276 Richard W. Madsen and Melvin L. Moeschberger, *Statistical Concepts with Applications to Business and Economics*, 104 (2nd Edition 1986).

277 *See* Appendix B. In fact, among the direct costs for the LECs' overall highest-priced central offices, only Nevada's DC power and DS1 and DS3 cross-connection and termination equipment direct costs and US West's DS3 cross-connection and termination equipment direct costs are greater than the LEC average direct cost plus two standard deviations for these functions.

making disallowances to the LECs' direct costs of providing physical collocation because it strikes a balance between use of the average or median and use of the average plus two standard deviations.[278] Under this standard, the direct costs of a substantial majority of the LECs are deemed reasonable. It recognizes that some LECs may be more efficient providers of physical collocation than others. At the same time, any possible efficiencies are not likely to explain why a number of the LECs' direct costs for each function are substantially out of line with those of the other LECs for the same function, and the use of the overall LEC average plus one standard deviation leads to disallowances to the direct cost of all of these LECs.[279] In short, we believe that it is reasonable to allow direct costs that are clustered reasonably close to the overall norm for the LEC industry and to disallow the direct costs that fall outside the cluster.[280] Accordingly, we adopt the overall average plus one standard deviation for a particular function as our statistical standard for making disallowances to the LECs' physical collocation direct costs. We describe our methodology, and apply this standard below.

c. Methodology for Calculating Industry Average Direct Costs for Physical Collocation Service

i. Overview

150. In order to analyze the LECs' direct costs of providing physical collocation, we develop a data base comprised of the direct costs of those LECs that either currently offer physical collocation service and are subject to this investigation, or previously provided physical collocation service and had at least one customer. We use this data base to compute an industry-wide average direct cost and the standard deviation of that cost relative to that average for each function associated with providing physical collocation. Where a LEC's direct cost for a particular function is in excess of the average plus one standard deviation, we examine the LEC's cost data and any explanations that the LEC may provide on the record in order to determine whether the LEC justifies the high direct cost for that function. In the absence of adequate cost justification for the function, we generally make direct cost disallowances to the extent that such costs exceed the average plus one standard deviation.[281]

151. The methodology for developing the direct cost data base, the overall LEC average, the standard deviation, and the direct cost disallowances are explained below. In Appendix B, we list the direct costs that the LECs report for each function, as well as the

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[278] The methodology for calculating the industry average direct cost plus one standard deviation is contained in Section III.C.2.c *infra.*

[279] *Id.*

[280] *Id.*

[281] We apply a different methodology for disallowing excess costs in some cases where LECs develop separate direct costs for different central offices. *See* Section III.C.2.c.v *infra.*

industry-wide average direct cost and standard deviation for that function. In Appendix C, we explain the method by which we require LECs to recalculate their direct costs for a particular function, where such costs are in excess of the overall LEC average plus one standard deviation for that function.

ii. Statistical Sample of LECs' Direct Costs

152. Fourteen of the 16 LECs that were required initially to file physical collocation tariffs either currently offer physical collocation service or previously offered the service and had at least one physical collocation customer.[282] The data base is comprised of the direct costs of these 14 LECs. United and GSTC currently offer virtual collocation in lieu of physical collocation service and, although they offered physical collocation when they were required to do so, they never had a physical collocation customer.[283] Consequently, we exclude the direct costs of these two LECs from the database, because these LECs do not have an active physical collocation tariff on file, and are neither required to file physical collocation tariff revisions because they elected not to retain their physical collocation tariffs after we issued the *Virtual Collocation Order*, nor subject to refund liability because they never had a physical collocation customer. Accordingly, the issues raised regarding these tariffs are moot, and there is no need to include these tariffs in our analysis.

153. The direct costs of some of the 14 LECs in our data base are averaged direct costs applicable to all of these LECs' central offices.[284] Other LECs develop separate direct costs for different central offices or for different groups of central offices.[285] For those LECs that develop averaged direct costs applicable to all of their central offices, we use those averaged direct costs for our data base sample. For those LECs that develop separate direct costs for different central offices, we use the direct costs for the one central office with the highest total price. In order to determine the overall highest-priced central office for a given LEC, we examine the LEC's sample price-out analysis of providing 100 DS1s. Each LEC

[282] The 14 LECs are Ameritech, Bell Atlantic, BellSouth, Central, CBT, GTOC, Lincoln, Nevada, NYNEX, Pacific, Rochester, SNET, SWB, and US West.

[283] *See* Letter from F. Gordon Maxson, Director - Regulatory Affairs, GTE to William F. Caton, Secretary, FCC (dated November 27, 1995); Letter from Warren D. Hannah, Director - Federal Relations, Sprint to William F. Caton, Secretary, FCC (dated December 7, 1995).

[284] *See* Ameritech Direct Case, Appendix B; Bell Atlantic Direct Case, Attachments A and B, Erratum to Direct Case (filed September 1, 1993), Supplement to Direct Case (filed September 24, 1993); BellSouth Direct Case, Exhibit 1; Lincoln Direct Case, TRP Charts; Rochester Direct Case, Appendix A; SNET Direct Case, Attachment 1.

[285] *See* CBT Direct Case, Tabs 1-5; GTE/GTOC Direct Case, Attachments 1,5,7,8,12,14,15; Nevada Direct Case, Appendix A; NYNEX Direct Case, Attachment A; Data Request Response from Jo Ann Goddard, Director, Federal Regulatory Relations, Pacific to Gregory J. Vogt, Chief, Tariff Division, Common Carrier Bureau (Dated April 28, 1994); Sprint/Central Direct Case, Exhibit 1; SWB Direct Case, Appendix 1; US West Direct Case, Appendix A.

submitted such an analysis pursuant to the Bureau's *Designation Order*[286] and subsequent data request letters.[287] As opposed to the TRP charts on which LECs provide the unit cost for each function separately, the sample price-out chart identifies the overall total costs (*i.e.*, the direct costs plus overheads for all 14 functions summed) of providing 100 DS1s at a central office in a typical physical collocation arrangement. These overall total costs equal the overall total price that an interconnector must pay for that service. We, therefore, refer to the central office for which a LEC develops the highest costs as the overall highest-priced central office. For each LEC that develops separate direct costs for different central offices, we select the central office with the overall highest total price from the sample price-out charts. The highest priced central offices for those LECs that develop separate direct costs for different central offices are those that had physical collocation rates in effect on or before April 15, 1994.

154. In those cases where LECs derive separate direct costs for different central offices, we focus our statistical analysis on such LECs' highest-priced central offices because the record in this proceeding does not contain any information on the type of central offices that have the largest demand for physical collocation service. In the absence of this information, we find that statistical disallowances should conservatively target only those direct costs that lie clearly outside the norm for the LEC industry. Calculating the LEC average direct cost and standard deviation of this cost relative to that average for each function using the direct costs for the LECs' overall highest-priced central offices in those cases where LECs developed separate direct costs for different central offices, and using this average and standard deviation to judge the reasonableness of the direct costs for every central office, is a conservative approach that satisfies this objective.

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[286] *See Designation Order*, 8 FCC Rcd at 6913.

[287] The Bureau asked the LECs to provide sample price-out analyses in its data request letters of April 15, 1994. *See* Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Donna M. Hermerding, Ameritech Services (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Maureen Keenan, Bell Atlantic (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to R. W. Fleming, Operations Manager, Pricing, BellSouth (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to William F. Wardwell, Central Telephone Companies (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to R. E. Sigmon, Vice President, Regulatory Affairs, Cincinnati Bell (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Everett H. Williams, Director, Pricing and Tariffs, GSTC (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Robert A. Mazer, Nix, Hargrave, Devans, & Doyle Attorneys and Counselors at Law (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Robert C. Blanz, President and CEO, Nevada Bell (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Don Evans, Executive Director, Federal Regulatory Matters, NYNEX (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Al Swan, Executive Director, Regulatory Matters, Pacific Bell (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Michael Shortley, Attorney for Rochester Telephone Corporation (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Rochelle D. Jones, Director - Regulatory, SNET (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to William A. Blase, Jr., Southwestern Bell (dated April 15, 1994); Letter from Gregory J. Vogt, Chief, Tariff Division, FCC to Cyndie Eby, Executive Director, Federal Regulatory, U S West (dated April 15, 1994).

155. GTOC and Central develop separate direct costs for different study areas, but have physical collocation customers in only one study area.[288] Therefore, the data base includes only the direct costs of GTOC and Central for the particular study area in which each provides physical collocation. We do not include the direct costs of the central offices in their other study areas in the database, because GTOC and Central do not have a physical collocation tariff for these other study areas currently on file, and consequently are not required to file physical collocation tariff revisions or subject to refund liability for these other central offices.

156. We exclude from the data base the direct costs of particular functions certain LECs offer because these costs are not comparable to those of the other LECs that we include in the database. For example, we exclude the floor space direct costs and DC power direct costs of BellSouth, CBT, and Central from the data base because, unlike other LECs, these LECs apparently include the cost of AC power converted to DC power in their floor space direct costs.[289]

157. We remove the LECs' direct costs for POT bays and repeaters from the DS1 and DS3 cross-connection and termination equipment direct costs because (1) not all LECs develop direct costs for POT bays and repeaters, (2) we disallow costs for repeaters in this Order, and (3) LECs that offer physical collocation on a going forward basis are required to unbundle and develop separate rates for POT bays and to allow the interconnectors to provide this equipment themselves.[290] The cross-connection and termination equipment direct costs for the LECs that develop direct costs for repeaters and POT bays are only comparable to those of the LECs that do not develop direct costs for POT bays and repeaters if we remove the direct costs of the repeaters and POT bays from the cross-connection and termination equipment function because all LECs' cross-connection and termination equipment direct costs for this function, exclusive of repeaters and POT bays, should be similar.

158. Moreover, we exclude direct costs for a particular function that are either greater than two standard deviations[291] above the LEC direct cost average or greater than two

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[288] *See* Letter from F. Gordon Maxson, Director - Regulatory Affairs, GTE to William F. Caton, Secretary, FCC (dated November 27, 1995); Letter from Warren D. Hannah, Director - Federal Regulatory Relations, Sprint to William F. Caton, Secretary, FCC (dated December 7, 1995). GTOC had no physical collocation customers in any city other than in Plano, Texas. The direct costs of GTOC that are in the data base are those for GTOC's Plano, Texas NW (EDS) central office. Central had no physical collocation customers in any state other than in Illinois. The direct costs of Central that are in the data base are for Central's Des Plaines, Illinois central office. Those two central offices have the highest overall price for physical collocation service in those cities.

[289] *See* Sections III.C.2.d and III.C.2.e *infra*.

[290] *See* Section III.C.1.f.ii *infra*.

[291] The formula for the sample standard deviation is used for this purpose. The rationale for use of the sample standard deviation is discussed below.

standard deviations below the LEC direct cost average.[292] We make these exclusions in order to minimize the likelihood that the data distribution would be skewed unreasonably upward by one or two extremely high direct cost data points or downward by one or two extremely low direct cost data points.[293] For example, we remove Nevada's DC power and DS1 and DS3 cross-connection and termination equipment direct costs from the data base because the direct costs for these functions exceed the industry average by more than two standard deviations.[294] No LEC's direct cost for any function is less than two standard deviations below the overall LEC average and we do not exclude the direct costs of any LEC from the data base for that reason.

iii. Direct Cost Data

159. We derive the direct cost information in the data base from data that the following LECs submitted in TRP format in their direct cases and *ex parte* filings: Ameritech;[295] Bell Atlantic;[296] BellSouth;[297] CBT;[298] GTE;[299] Lincoln;[300] Nevada;[301] NYNEX;[302]

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[292] The determination as to whether a LEC's direct costs are greater than two standard deviations above or greater than two standard deviations below the LEC direct cost average was made after all of the adjustments described above were made to the data base.

[293] A distribution that is skewed is one that is not symmetric. A distribution is skewed upward if the longer of the distribution's two tails is to the right. Conversely, a distribution is skewed downward if the longer tail is on the left.

[294] *See* Sections III.C.2.e and III.C.2.f *infra.*

[295] *See* Ameritech Direct Case, Appendix B; Data Request Response from John C. Litchfield, Director Costs, Ameritech to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 26, 1994).

[296] *See* Bell Atlantic Direct Case, Attachments A, B; Erratum to Direct Case (filed September 1, 1993); Supplement to Direct Case (filed September 24, 1993); Bell Atlantic Transmittal No. 645 (dated April 1, 1994); Data Request Response from Maureen Keenan, Director-FCC Relations, Bell Atlantic to Mr. William F. Caton, Acting Secretary, FCC (dated April 26, 1994); Letter from Maureen Keenan, Director-FCC Relations, Bell Atlantic to Mr. William F. Caton, Acting Secretary, FCC (dated June 3, 1994).

[297] *See* BellSouth Direct Case, Exhibit 1; Data Request Response from Whit Jordan, Director-Federal Regulatory, BellSouth to Mr. William F. Caton, Acting Secretary, FCC (dated April 26, 1994); Letter from Whit Jordan, Director-Federal Regulatory, BellSouth to Mr. William F. Caton, Acting Secretary, FCC (dated May 19, 1994).

[298] *See* CBT Direct Case, Tabs 1-5; Data Request Response from Alfred J. Titus, Jr., Regulatory Affairs, CBT to Mr. William F. Caton, Acting Secretary, FCC (dated April 26, 1994).

[299] *See* GTE/GTOC Direct Case, Attachments 1, 5, 7, 8, 12, 14, 15; Data Request Response from F. Gordon Maxson, Director, Regulatory Affairs, GTE to Mr. William F. Caton, Acting Secretary, FCC (dated April 28, 1994).

[300] *See* Lincoln Direct Case, TRP Charts, Appendix A, Exhibit A; Data Request Response from Robert Mazer, Counsel for Lincoln, to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 25, 1994).

Pacific;[303] Rochester;[304] SNET;[305] Sprint;[306] SWB;[307] and US West.[308] On these TRP charts, LECs set forth their per unit recurring direct costs *(e.g.*, dollars per square foot per month for central office floor space) and per unit nonrecurring direct costs (*e.g.*, dollars per cage for a physical collocation enclosure) for 14 different physical collocation functions.

160. We adjust the LECs' TRP data to reflect the direct cost disallowances the Bureau made in the *Physical Collocation Tariff Suspension Order*.[309] We make this adjustment to the direct cost data because we are affirming those disallowances in this Order.[310] We do not adjust the LECs' direct cost data to reflect the direct cost disallowances that we make in our case-by-case analysis in Section III.C.1, however, because the LECs do not provide enough information for the proper implementation of these adjustments. Accordingly, the function-by-function analysis and the case-by-case analysis are independent, rather than complementary, analyses.

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[301] *See* Nevada Direct Case, Appendix A; Data Request Response from Joanne Goddard, Director, Federal Regulatory Relations, Pacific to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 26, 1994); Letter from Joanne Goddard, Director, Federal Regulatory Relations, Pacific to Carol Canteen, Tariff Division, FCC (dated May 20, 1994); Letter from Joanne Goddard, Director, Federal Regulatory Relations, Pacific to Gregory J. Vogt, Chief, Tariff Division, FCC (dated June 2, 1994).]

[302] *See* NYNEX Direct Case, Attachment A; Data Request Response from Alan Cort, Staff Director, Federal Regulatory Matters, NYNEX to Mr. William F. Caton, Acting Secretary, FCC (dated April 26, 1994).

[303] *See* Data Request Response from Joanne Goddard, Director, Federal Regulatory Relations, Pacific Bell to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 28, 1994).

[304] *See* Rochester Direct Case, Appendix A; Data Request Response from Michael J. Shortley III, Attorney for Rochester to Carol C. Canteen, Tariff Division, FCC (dated April 27, 1994).

[305] *See* SNET Direct Case, Attachment 1; Data Request Response from Eugene J. Baldrate, Director-Federal Regulatory, SNET to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 26, 1994).

[306] *See* Sprint/Central Telephone Direct Case, Exhibit 1; Data Request Response from Warren Hannah, Director, Federal Regulatory Relations, Sprint to Mr. Charles Needy, FCC (dated May 9, 1994).

[307] *See* SWB Transmittal No. 2260 (dated February 16, 1993); SWB Direct Case, Appendix 1; Letter from William A. Blase, Director, Federal Regulatory Relations, SWB to Gregory J. Vogt, Chief, FCC (dated April 6, 1994); Data Request Response from Rocky Hudson, District Manager Access Tariff, SWB to Gregory J. Vogt, Chief, Tariff Division, FCC (dated April 26, 1994); Letter from Rocky Hudson, District Manager Access Tariffs, SWB to Carol Canteen, FCC (dated May 18, 1994).

[308] *See* US West Direct Case, Appendix A; Data Request Response from Cyndie Eby, Executive Director, Federal Regulatory, US West to Mr. William F. Caton, Acting Secretary, FCC (dated April 26, 1994).

[309] *See Physical Collocation Tariff Suspension Order*, 8 FCC Rcd at 4598-99.

[310] *See* Section III.C.1.b *supra*.

161. We convert the per unit direct costs to the total direct costs of a typical physical collocation arrangement by multiplying per unit direct costs (*e.g.*, dollars per feet of conduit) by number of units (*e.g.*, per feet of conduit). The direct costs that we calculate for the function-by-function analysis are for the provision of 100 DS1s.[311] In general, we use the LECs' assumptions to establish the amount of each unit needed to provide 100 DS1s through a physical collocation arrangement. The LECs set forth these assumptions in their direct cases and in their responses to the Bureau's data requests submitted to LECs on April 15, 1994.[312] We compute the LECs' direct costs based on the assumption that LECs will provide 100 DS1s through a physical collocation arrangement because we believe that 100 DS1s is a reasonable estimate of the sales level an interconnector may realistically reach, given sufficient time to implement its business plans and establish its presence as a going concern capable of providing a competitive alternative to an incumbent LEC's service in the interstate access market. Moreover, we are comparing direct costs among LECs rather than evaluating the direct costs of any particular LEC in isolation. Given that physical collocation service is substantially similar among LECs, and the technology required to provide that service is not likely to vary significantly among LECs, the selection of any particular business volume such as 100 DS1s should not affect relative differences among the LECs' direct costs.

162. We convert per unit direct costs to total direct costs because a comparative analysis of per unit direct costs among LECs is not feasible. An individual physical collocation function is typically comprised of a number of separate rate elements for which the corresponding costs are expressed in different units (*e.g.*, per linear feet, per interconnection arrangement). It is not mathematically possible to add per unit costs within a function and arrive at a total per unit cost unless the units are identical. Consequently, in order to add the separate rate elements together, which is necessary to calculate the direct cost for the entire function, we convert the per unit direct costs for each separate rate element to total direct costs. The conversion to direct costs from per unit direct costs is also necessary in order to compare direct costs for a particular function among LECs, because different LECs express the same direct costs in different units.

163. For the purpose of computing DC power direct costs, we do not use the LECs' assumptions regarding the number of units required to support 100 DS1s . We develop the direct costs of DC power based on the assumption that 40 amps of DC power is required to support 100 DS1s. We rely on this assumption because most LECs charge for DC power in increments, and none of these LECs establishes an initial increment that exceeds 40 amps. Nor do any of these LECs indicate that more than 40 amps of DC power is required to support 100 DS1s. Where it is not possible for an interconnector to purchase precisely 40 amps of DC power, we compute the direct cost of DC power based on an assumed purchase

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[311] DS3 cross-connection and termination equipment direct costs and security escort direct costs are not those of provisioning 100 DS1s. As explained below, DS3 cross-connection and termination equipment direct costs are those of provisioning four DS3s. Security escort direct costs are calculated on an hourly basis.

[312] *See* notes 295-308 *supra.*